

WHAT IS CLAIMED IS:

Suba² 1. A method for bleaching a pulp containing lignocellulosic fibers with one or more chlorine containing compounds comprising contacting the pulp during one or more chlorine bleaching stages with an amount of chelating agent sufficient to increase the brightness of the pulp over the brightness of pulp which has been treated with a chelating agent after a final washing or extraction stage of the bleaching process, whereby an adsorbable organic halide content of the bleached pulp is significantly reduced.

2. The method of Claim 1 wherein the consistency of the pulp during bleaching is maintained within the range of from about 0.5% to about 40% by weight.

3. The method of Claim 1 wherein the amount of chelating agent ranges from about 0.01 wt. % to about 1.0 wt. % based on the dry weight of pulp being contacted.

4. The method of Claim 1 wherein the chelating agent is selected from the group consisting of aminopolycarboxylic acids and aminopolyphosphonic acids and the alkaline metal salts thereof.

5. The method of Claim 4 wherein the chelating agent is selected from the group consisting of ethylenediaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA), nitrilotriacetic acid (NTA), hydroxyethylenediaminetriacetic acid, diethylenetriaminepenta(methylenephosphonic) acid (DTPMA) and the alkali or alkaline earth salts thereof.

Suba³ 6. The method of Claim 1 wherein the pulp has a pH in the range of from about 3 to about 7, a temperature in the range of from about 35°C to about 90°C.

7. The method of Claim 1 wherein the contacting is conducted for a period of time ranging from about 30 seconds to about 3 hours.

8. The method of Claim 1 further comprising contacting the pulp with a chlorine-free oxygen containing

bleaching agent subsequent to the one or more chlorination stages.

9. The method of Claim 8 wherein the oxygen containing bleaching agent is a peroxide.

Sub a⁴ 10. The method of Claim 9 further comprising contacting the pulp with one or more peroxide stabilizers.

11. The method of Claim 1 wherein the pulp to be bleached is an oxygen delignified pulp.

12. The method of Claim 1 wherein the pulp is contacted with the chelating agent during an initial chlorine or chlorine dioxide bleaching stage.

13. The method of Claim 1 wherein the bleaching operation comprises an initial chlorination stage, an extraction stage, and a peroxide stage.

14. The method of Claim 1 wherein the bleaching operation comprises an initial chlorination stage, an extraction stage, a chlorine dioxide bleaching stage and a peroxide stage.

Sub a⁵ 15. The method of Claim 14 wherein the pulp is contacted with the chelating agent during both the initial chlorination stage and during the chlorine dioxide stage.

16. The method of Claim 15 further comprising contacting the pulp with one or more peroxide stabilizers.

17. The method of Claim 16 wherein the peroxide stabilizers are selected from the group consisting of magnesium sulfate and sodium silicate.

18. The method of Claim 14 wherein the pulp is contacted with the chelating agent during the extraction stage.

Sub a⁶ 19. A process for bleaching a pulp containing lignocellulosic fibers comprising:

maintaining the pulp at a consistency in the range of from about 0.5% to about 40% and maintaining the pH in the range of from about 1 to about 9;

bleaching the pulp with a chlorine compound in a bleaching stage; and

Sub a⁶
10 contacting the pulp during a bleaching stage or before a washing stage after the bleaching stage with from about 0.01 wt.% to about 1 wt. % chelating agent, based on the dry weight of fibers in the pulp for a period of time sufficient to improve the brightness of the pulp, whereby an adsorbable organic halide content of the pulp is significantly reduced.

20. The process of Claim 19 wherein the amount of chelating agent ranges from about 0.03 wt.% to about 0.5 wt.% based on the dry weight of pulp.

21. The process of Claim 19 wherein the chlorine compound is selected from the group consisting of chlorine dioxide, chlorine gas, and a mixture of chlorine dioxide and chlorine gas.

Sub a⁷
22. The process of Claim 19 further comprising contacting the pulp with the chelating agent at substantially the same time as the pulp is bleached with the chlorine containing compound.

23. The process of Claim 19 wherein the chelating agent is selected from the group consisting of aminopolycarboxylic acids and aminopolyphosphonic acids and the alkaline metal salts thereof.

5 24. The process of Claim 23 wherein the chelating agent is selected from the group consisting of ethylenediaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA), nitrilotriacetic acid (NTA), hydroxyethylenediaminetriacetic acid, diethylenetriaminepenta(methylenephosphonic) acid (DTPMA) and the alkali or alkaline earth salts thereof.

Sub a⁸
25. The process of claim 19 wherein the pulp has a pH in the range of from about 3 to about 7, a temperature in the range of from about 35°C to about 90°C.

26. The process of Claim 19 wherein the contacting is conducted for a period of time ranging from about 30 seconds to about 3 hours.

27. The process of Claim 19 further comprising contacting the pulp with a chlorine-free oxygen containing bleaching agent subsequent to the bleaching step.

28. The process of Claim 27 wherein the oxygen containing bleaching agent is a peroxide.

Sub a⁹ 29. The process of Claim 28 further comprising contacting the pulp with one or more peroxide stabilizers.

30. The process of Claim 19 further comprising contacting the pulp with the chelating agent during an initial chlorine or chlorine dioxide bleaching step.

31. The process of Claim 19 wherein the pulp is bleached in a bleaching operation comprising an initial chlorination step, an extraction step, and a peroxide step.

32. The process of Claim 19 wherein the pulp is bleached in a bleaching operation comprising an initial chlorination step, an extraction step, a chlorine dioxide bleaching step and a peroxide step.

Sub a¹⁰ 33. The process of Claim 32 wherein the pulp is contacted with the chelating agent during both the initial chlorination step and during the chlorine dioxide step.

34. The process of Claim 33 further comprising contacting the pulp with one or more peroxide stabilizers.

35. The process of Claim 34 wherein the peroxide stabilizers are selected from the group consisting of magnesium sulfate and sodium silicate.

Sub a¹¹ 36. A process for bleaching a pulp containing lignocellulosic fibers with chlorine and non-chlorine containing bleaching agents, wherein the pulp has a consistency in the range of from about 0.5% to about 40% and has a pH in the range of from about 1 to about 9, the process comprising:

treating the pulp with chlorine dioxide in a first chlorination stage;

10 contacting the chlorinated pulp with a first amount of metal chelating agent subsequent to the first chlorination stage, wherein the amount of chelating agent is sufficient to reduce an organic halide content of the bleached pulp and wherein the temperature of the pulp during the contacting is within the range of from about 35° to about 110°C; and

15 bleaching the chlorinated pulp with a chlorine-free bleaching agent after contacting with the chelating agent.

37. The process of Claim 36 wherein the amount of chelating agent ranges from about 0.03 wt.% to about 0.5 wt.% based on the dry weight of pulp.

38. The process of Claim 36 wherein the chelating agent is contacted with the pulp at substantially the same time as the pulp is bleached with chlorine dioxide.

39. The process of Claim 36 wherein the chelating agent is selected from the group consisting of aminopolycarboxylic acids and aminopolyphosphonic acids and the alkaline metal salts thereof.

40. The process of Claim 39 wherein the chelating agent is selected from the group consisting of ethylenediaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA), nitrilotriacetic acid (NTA),
5 hydroxyethylenediaminetriacetic acid, diethylenetriaminepenta(methylenephosphonic) acid (DTPMA) and the alkali or alkaline earth salts thereof.

Suba¹² 41. The process of Claim 36 wherein the pulp has a pH in the range of from about 3 to about 7, a temperature in the range of from about 35°C to about 90°C.

42. The process of Claim 36 wherein the contacting is conducted for a period of time ranging from about 30 seconds to about 3 hours.

43. The process of Claim 36 wherein the oxygen containing bleaching agent is a peroxide.

Suba¹³ 44. The process of Claim 43 further comprising contacting the pulp with one or more peroxide stabilizers.

45. The process of Claim 36 further comprising bleaching the pulp with chlorine dioxide in a second bleaching stage and contacting the pulp with a second amount of chelating agent during or after the second bleaching stage.

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